

Claims

1. A method of analyzing a biosample using laser ablation,
wherein

5 by irradiating ultra-short pulse laser beams on a
biosample to be analyzed and ablating the sample, molecules
contained in said biosample are atomized into constituting
element, said atomized constituting elements are ionized, said
ionized constituting elements are analyzed, and molecules to
10 be analyzed in said biosample are analyzed.

2. The method of analyzing a biosample using laser ablation
according to Claim 1, wherein

 by directly or indirectly labeling a substance having
15 specific bond to molecules to be analyzed in said biosample and
analyzing the molecules to which said labeled substance is
bonded, molecules to be analyzed in said biosample are analyzed.

3. The method of analyzing a biosample using laser ablation
20 according to Claim 2, wherein

 said labeled substance having specific bond is nucleic
acid.

4. The method of analyzing a biosample using laser ablation
25 according to any one of Claims 1, 2 and 3, wherein

 the molecules to be analyzed in said biosample are nucleic
acid.

5. The method of analyzing a biosample using laser ablation according to Claim 3, wherein

the nucleic acid being said labeled substance having specific bond contains DNA, RNA, PNA, and other modified acid.

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6. The method of analyzing a biosample using laser ablation according to any one of Claims 2, 3, 4 and 5, wherein

said labeled substance having specific bond is bonded by hybridization.

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7. The method of analyzing a biosample using laser ablation according to any one of Claims 2, 3, 4 and 5, wherein

said labeled substance having specific bond is aptamer.

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8. The method of analyzing a biosample using laser ablation according to any one of Claims 3, 4, 5, 6 and 7, wherein

the labeling of said nucleic acid is performed by a TUNEL method.

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9. The method of analyzing a biosample using laser ablation according to any one of Claims 1 and 2, wherein

the molecules to be analyzed in said biosample are protein.

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10. The method of analyzing a biosample using laser ablation according to Claim 9, wherein

said labeled substance having specific bond, which is used for analyzing said protein, is bonded by antigen-antibody

reaction.

11. The method of analyzing a biosample using laser ablation according to any one of Claims 2, 3, 4, 5, 6, 7, 8, 9 and 10, wherein

said label is an element label.

12. The method of analyzing a biosample using laser ablation according to Claim 11, wherein

said element label is a stable isotopic element label.

13. The method of analyzing a biosample using laser ablation according to any one of Claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12, wherein

the analysis of said ionized constituting element is mass spectrometry.

14. The method of analyzing a biosample using laser ablation according to Claim 13, wherein

said mass spectrometry is mass spectrometry by a time-of-flight method.

15. The method of analyzing a biosample using laser ablation according to any one of Claims 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14, wherein

multi-channeling is conducted by using plural types of labels as labels, and at least 2 types or more molecules in a single biosample are analyzed as analytical-target molecules.

16. The method of analyzing a biosample using laser ablation according to any one of Claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 and 15, wherein

5 by allowing a tissue image, which is obtained by observing said biosample by a microscope, to correspond to the position of said ablated spot, localization of analytical-target molecules in said biosample is analyzed.

10 17. The method of analyzing a biosample using laser ablation according to any one of Claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16, wherein

 the pulse time width of said ultra-short pulse laser beams are 1 femto second or more and 1 pico second or less, and the
15 peak value output of the laser beam is 1 mega watt or more and 10 giga watts or less.

18. The method of analyzing a biosample using laser ablation according to any one of Claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,
20 11, 12, 13, 14, 15, 16 and 17, wherein

 said biosample is a biotissue section or a smear sample.

19. An analyzing apparatus of a biosample using laser ablation, comprising:

25 an ultra-short pulse laser generating unit capable of outputting ultra-short pulse laser beams, which by irradiating the beams on a biosample to be analyzed and ablating the biosample, atomizes molecules contained in said biosample into

constituting elements, and ionizes said atomized constituting elements;

a spectrometer that introduces and analyzes the constituting elements that are ionized by the ultra-short pulse laser beams outputted from said ultra-short pulse laser generating unit; and

a microscope unit for observing the shape of said biosample to be analyzed.

10 20. The analyzing apparatus of a biosample using laser ablation according to Claim 19, wherein

said microscope unit is an upright microscope,

the objective lens of said upright microscope is arranged on the upper surface of said biosample, and the irradiation of the ultra-short pulse laser beams from said ultra-short pulse laser generating unit is performed from the lower surface of said biosample.

20 21. The analyzing apparatus of a biosample using laser ablation according to Claim 19, wherein

said microscope unit is an upright microscope unit,

the objective lens of said upright microscope is arranged on the upper surface of said biosample, and the irradiation of the ultra-short pulse laser beams from said ultra-short pulse laser generating unit is performed from the upper surface of said biosample.

22. The analyzing apparatus of a biosample using laser ablation

according to Claim 19, wherein

said microscope unit is an inverted microscope,

the objective lens of said inverted microscope is arranged on the lower surface of said biosample, and the irradiation of the ultra-short pulse laser beams from said ultra-short pulse laser generating unit is performed from the upper surface of said biosample.

23. The analyzing apparatus of a biosample using laser ablation

according to Claim 19, wherein

said microscope unit is an inverted microscope,

the objective lens of said inverted microscope is arranged on the lower surface of said biosample, and the irradiation of the ultra-short pulse laser beams from said ultra-short pulse laser generating unit is performed from the lower surface of said biosample.

24. The analyzing apparatus of a biosample using laser ablation according to any one of Claims 19, 20, 21, 22 and 23, wherein

said ultra-short pulse laser generating unit outputs ultra-short pulse laser beams whose pulse time width is 1 femto second or more and 1 pico second or less and whose peak value output is 1 mega watt or more and 10 giga watts or less.

25. The analyzing apparatus of a biosample using laser ablation according to any one of Claims 19, 20, 21, 22, 23 and 24, said apparatus further comprising:

an image analysis apparatus that analyzes images observed

by said microscope unit.

26. The analyzing apparatus of a biosample using laser ablation according to any one of Claims 19, 20, 21, 22, 23, 24 and 25,

5 wherein

said biosample is a biotissue section or a smear sample.